

Response Under 37 CFR 1.116
Expedited Procedure
Examining Group 1700
Application No. 10/540,365
Paper Dated: March 28, 2008
In Reply to USPTO Correspondence of December 3, 2007
Attorney Docket No. 2950-051771

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 10/540,365 Confirmation No. 3495

Applicants : Hiroshi Morikawa et al.

Filed : June 23, 2005

Title : WORK-HARDENED MATERIAL FROM
DO NOT ENTER: /D.Y./ STAINLESS STEEL

Group Art Unit : 1793

Examiner : Deborah Yee

Customer No. : 28289

Mail Stop AF
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT AFTER FINAL

Sirs:

In response to the Office Action dated December 3, 2007 and marked Final, Applicants submit the following amendments, remarks, and the accompanying Petition for Extension of Time Under 37 C.F.R. §1.136(a) extending the time for response until April 3, 2007.

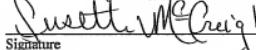
Amendments to the claims begin on page 2 of this paper.

Remarks begin on page 4 of this paper.

I hereby certify that this correspondence is being submitted electronically to the United States Patent and Trademark Office on the date below.

Susette McCreight

(Name of Person Submitting Paper)

 March 28, 2007
Signature Date

Response Under 37 CFR 1.116
Expedited Procedure
Examining Group 1700
Application No. 10/540,365
Paper Dated: March 28, 2008
In Reply to USPTO Correspondence of December 3, 2007
Attorney Docket No. 2950-051771

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

Claims 1-3 (Cancelled).

Claim 4 (Currently Amended): A work-hardened stainless steel sheet comprising:

a chemical composition consisting of 0.15 mass % or less of C, 1.0 mass % or less of Si, 1.0 mass % or less of Mn, 0.005 mass % or less of S, ~~10-20~~ 10-12.6 mass % of Cr, 0.5 mass % or less of Ni, 0.001-0.05 mass % of Al and the balance being Fe except inevitable impurities; and

a work-hardened ferritic structure, wherein at least one of Al_2O_3 and $\text{Al}_2\text{O}_3\cdot\text{MgO}$ inclusions of 10 μm or less in size are distributed with an index of cleanliness of 0.06% or less.

Claim 5 (Previously Presented): The work-hardened stainless steel sheet of claim 4, wherein the stainless steel sheet has yield strength within a range of 500-900 N/mm².

Claim 6 (Currently Amended): A work-hardened stainless steel sheet comprising:

a chemical composition consisting of 0.15 mass % or less of C, 1.0 mass % or less of Si, 1.0 mass % or less of Mn, 0.005 mass % or less of S, ~~10-20~~ 10-12.6 mass % of Cr, 0.5 mass % or less of Ni, 0.001-0.05 mass % of Al, and at least one of 0.5-2.0 mass % of Mo, 0.5-3.0 mass % of Cu and 0.05-1.0 mass % of Nb, and the balance being Fe except inevitable impurities; and

Response Under 37 CFR 1.116

Expedited Procedure

Examining Group 1700

Application No. 10/540,365

Paper Dated: March 28, 2008

In Reply to USPTO Correspondence of December 3, 2007

Attorney Docket No. 2950-051771

a work-hardened ferritic structure, wherein at least one of Al_2O_3 and $\text{Al}_2\text{O}_3\text{-MgO}$ inclusions of $10 \mu\text{m}$ or less in size are distributed with an index of cleanliness of 0.06% or less.

Claim 7 (Previously Presented): The work-hardened stainless steel sheet of claim 6, wherein the stainless steel sheet has yield strength within a range of 500-900 N/mm^2 .

Response Under 37 CFR 1.116

Expedited Procedure

Examining Group 1700

Application No. 10/540,365

Paper Dated: March 28, 2008

In Reply to USPTO Correspondence of December 3, 2007

Attorney Docket No. 2950-051771

REMARKS

Claims 4-7 are currently pending in the application with claims 4 and 6 being in independent form. Claims 4 and 6 have been amended to reduce the upper limit of Cr content in the stainless steel sheet from 20 mass % to 12.6 mass %. Accordingly, claims 4 and 6 state that the range of Cr content in the stainless steel sheet comprises 10-12.6 mass % of Cr. Support for this amendment is provided in Table 4 of the originally filed specification. No new matter has been added.

The Examiner's reconsideration is respectfully requested in light of the amendments made herein with the following remarks.

RESPONSE TO REJECTIONS

The present invention is directed to a work-hardened stainless steel sheet characterized by its chemical composition and metallurgical structure, which can be formed to a particular configuration without cracking, even under severe fabricating conditions. The formability and strength of the stainless steel sheet is achieved by the combination of desulfuring and deoxidizing with Al for modification of inclusions to fine Al_2O_3 or $\text{Al}_2\text{O}_3\text{:MgO}$ particles sized 10 μm or less with an index of cleanliness of 0.06% or less and by cold-rolling for formation of the work-hardened ferritic structure without requiring heat-treatment.

Typically bending workability of a stainless steel sheet obtained by work-hardening is generally worsened, however, the present invention teaches a work-hardened stainless steel sheet comprising a chemical composition consisting of specifically claimed components and a specific work-hardened ferritic structure. The combination of these features improves the strength and bending workability of the work-hardened stainless steel.

Claims 4-7 are finally rejected under 35 U.S.C. §103(a) as being obvious over the teachings of Japanese Patent 402270942 (hereinafter referred to as "JP '942"). The Office Action asserts that the English abstract of JP '942 teaches a ferritic stainless steel alloy having a composition with constituents whose wt% ranges overlap those recited by the claims of the present invention.

Applicants respectfully traverse the rejection of the claims for the following reasons. Independent claims 4 and 6 have been amended to recite that the stainless steel

Response Under 37 CFR 1.116

Expedited Procedure

Examining Group 1700

Application No. 10/540,365

Paper Dated: March 28, 2008

In Reply to USPTO Correspondence of December 3, 2007

Attorney Docket No. 2950-051771

composition contains 10-12.6 mass % of Cr to distinguish the present invention over the teachings of JP '942, which shows a Cr content of 14-26%. In general, the lower the Cr content in the steel, the softer the steel at the annealing state. Accordingly, the strength of the steel composition of the present invention is improved by work-hardening, i.e., cold-rolling. In order to obtain such improved strength, a steel composition including this lower Cr content requires higher rolling reduction, compared to a steel composition having a higher Cr content. Although cold-rolling at high rolling reduction generally decreases bendability, the steel of the present invention has been found to have excellent bendability *despite* being cold-rolled at high rolling reduction. JP '942 fails to teach this concept and specifically teaches a Cr content which is greater than that of the presently amended claims.

For the reasons set forth above, it is respectfully requested that the rejection of claims 4-7 under 35 U.S.C. §103(a) be withdrawn as JP' 942 fails to render these claims obvious.

CONCLUSION

In view of the arguments set forth above and the amendments to the claims, it is respectfully requested that this amendment be entered and all claims in the application, namely claims 4-7, be allowed and the application be passed to issue.

Respectfully submitted,
THE WEBB LAW FIRM

By Michele K. Yoder

Michele K. Yoder

Registration No. 41,562

Attorney for Applicants

436 Seventh Avenue

700 Koppers Building

Pittsburgh, PA 15219

Telephone: (412) 471-8815

Facsimile: (412) 471-4094

E-mail: webblaw@webblaw.com